It is a fact noted by many investigators, and especially insisted on by de Vries, that most races of domesticated species are derived from the wild form by the loss of one or more hereditary characters. That these race peculiarities are, generally speaking, recessive to the wild form is well established, and the reason therefore is apparently clear. But that these peculiarities may have originated ages ago in the wild form, and been transmitted almost unnoticed, has not hitherto been suggested. We have seen above that such may be the case. Furthermore, peculiarities that may have had indefinite time in which to develop are not greatly in need of a theory of "saltatory change" to explain their abundant development in domesticated species.

W. J. Spillman

U. S. Department of Agriculture

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE SECTION B—PHYSICS

The summer meeting of the American Association for the Advancement of Science, Section B, was held in the Wilder Laboratory of Dartmouth College, Hanover, N. H., June 30, 1908. This was a joint meeting with the American Physical Society. There were two sessions, one in the forenoon and one in the afternoon. The attendance at each was about seventy. Professor Edward L. Nichols, president of the American Physical Society and president last year of the American Association for the Advancement of Science, was the presiding officer.

The titles and abstracts of the sixteen papers presented are given below:

Light Pressure on Black Surfaces and on Thin Plates of Glass (with experimental demonstration): G. F. Hull, Dartmouth College.

Some years ago E. F. Nichols and Hull proved the existence experimentally of a pressure due to light upon a silvered glass surface. Maxwell had proved theoretically that such a pressure exists.

By Larmor's theory, however, the pressure on a glass surface should be zero. Professor Hull showed experiments which do not justify Larmor's conclusion. He exhibited an apparatus in action which showed the comparative effects obtained by allowing radiation of the same intensity to fall successively upon four kinds of surface. The results of such a comparison show the pressures to be as follows:

	Deflection
1 glass vane	1.0
2 glass vanes	1.7
Enclosed black vane	5.6
Silvered vane	11.5

These results indicate that Larmor's conclusion is incorrect. Maxwell's formula gives results quantitatively agreeing with the above measurements. For example, the values indicated for the above four cases by applying Maxwell's formula are 1.0, 1.83, 5.86 and 11.2, respectively.

(At the conclusion of the paper the president of the Physical Society, who was presiding, congratulated the section that all its members had been able to see for themselves an effect due to a force so small that the possibility of showing its actual existence had not been hoped for by eminent physicists until a very few years ago.)

Changes in Density of the Ether, and Some Optical Effects produced by it: Charles F. Brush, Cleveland.

This paper described two series of careful experiments, conducted on different lines, the results of which afford strong evidence in support of the following hypotheses:

1. The ether passes slowly, and *not* freely, through glass and presumably through other bodies.

2. The ether is susceptible of change in density. It may be dilated and presumably compressed in a glass vessel, the phenomenon lasting long enough to be observed with ease.

3. While dilation of the ether does not alter materially, if at all, the velocity of the light waves in it, it does reduce the amplitude or energy-carrying capacity of both long and short waves, *i. e.*, of low heat and actinic radiation.

The apparatus and experiments were fully described by means of a fine set of lantern slides, many of which showed photographic effects obtained during the experiments themselves.

On Oscillations in the Metallic Arc: W. G. Cady, Wesleyan University.

Two types of oscillations occurring in an electric arc light were considered. The first are produced in the iron arc in free air, with a frequency of about 1,500 per second. These seem to be mechanical and were dismissed with brief comment. The second type was considered more at length. They are of much higher frequency and occur with electrodes of various substances,

but best when one electrode is either copper or silver, the arc burning in illuminating gas. The oscillations are most intense with high voltage and a current between one ampere and the point at which the arc changes to a glow. To gain an idea of the maximum potential difference across the arc during one cycle an apparatus for obtaining a point discharge in hydrogen was connected in parallel with the arc. The results indicate that the effect is an exceedingly rapid change back and forth between arc and glow discharge, of a frequency of something like a million per second. Experiments were described on the use of a resonating circuit near the arc, and on the connection of a capacity and self-inductance across the arc.

A Study of Overcast Skies: EDWARD L. NICHOLS, Cornell University.

The spectrophotometric measurements which formed the basis of this paper were carried out by means of a portable apparatus which could readily be set up during the travels of the author in Europe, and gave the opportunity to compare the skies of widely different localities and different times of day. The relative intensities of the different color-components were very different with different kinds of sky. The radiation was scarcely ever selective but almost always of the "black body" type. There is, however, almost always an absorption band in the violet during the middle of a bright day in mountainous regions. Its development is coincident with the gathering of a slight mist.

The illumination from an unclouded sky is about the same as from a completely clouded sky. More light comes, however, from a sky which is partly covered with clouds than from either. The so-called "cumulus" clouds produce especially good luminosity.

Demonstration of Wilson's Cloud Experiment, etc.: G. F. HULL, Dartmouth College.

This consisted of a demonstration of several improved forms of lecture experiments, as follows:

1. A very simple and satisfactory form of Wilson's "cloud" experiment, showing the conditions under which the cloud is obtained.

2. Wehnelt's tube, in which electrons sent out by a "button" of calcium compound in an exhausted tube were shown experimentally to be present.

3. An improvement on Mayer's floating magnet experiment, consisting of passing a single turn of wire around the circular glass vessel, in which the small vertical magnets are made to float. By sending current through this wire the effect of surface tension at the boundary is entirely eliminated. The stable configurations of magnets are different from those secured when a central control magnet is used. But the fields due to the current and to a central magnet are easily superposed.

Interest in the floating magnet experiment has been recently revived by J. J. Thomson's theories regarding the structure of atoms.

The Influence of Temperature on the Fluorescence of Uranium Glass: R. C. GIBBS, Cornell University.

The glass used was a block of canary glass. The light from a mercury arc was sent through this glass, whose temperature was changed in a measurable way through about 400 degrees Centigrade. Results will be published in the *Physical Review.*

Some Electrical Properties of Silicon: FRANCES G. WICK, Cornell University.

The silicon used was made at Niagara Falls. The following properties were noted:

1. In its resistance it was found to change with temperature as carbon does and not as the metals.

2. The thermo-electric power with respect to lead was found to be 220, which is larger than for any other substances except selenium and tellurium.

3. It was found also that, as with selenium and tellurium, the Hall effect was large in silicon.

4. Rods of the element were used as one element in voltaic cells, but without developing any special promise of usefulness as compared with copper, etc. In its position in the electromotive series it is very near copper.

A Study of Short-time Phosphorescence: C. W. WAGGENER, Cornell University.

All good measurements since the time of Becquerel show about the same kind of luminosity-decay curve. The recent work which forms the basis of this paper was designed to see if this form is characteristic of substances which lose their luminosity in an exceedingly short interval, say within one seven-hundredth of a second. The apparatus used was that devised by Nichols and Merritt a year or two ago. It was found that practically the same form of decay curve characterizes substances of this class as those whose period of decay is longer.

An Experimental Study of the Recovery of Selenium Cells: L. S. MCDOWELL, Cornell University. (Read by title.)

A Comparative Investigation of Dispersion and Electric Double Refraction in Liquids: H. E. McCOMB, University of Nebraska. (Presented by Professor C. A. Skinner.)

This study showed in general that the change in refractive index follows the same law as that of the constant of electric double refraction. Six liquids were studied. Five of them showed this agreement, but one (di-methyl-aniline) showed no definite relation between the two constants.

Electromagnetic Mass and Energy: DANIEL F. COMSTOCK, Massachusetts Institute of Technology. (Read by title.)

Effects of Absorbed Hydrogen and of Other Gases on the Photoelectric Activity of Metals: V. L. CHRISLER, University of Nebraska. (Presented by Professor C. A. Skinner.)

Following the method used by Holman (*Phys. Rev.*, August, 1907) the effect upon its photoelectric activity of using a metal as cathode and as anode in a glow current, has been investigated. The effect of surrounding it by different gases has also been tested.

Using fourteen different metals, they showed, without exception, a decreased photo-electric current by continued use as a cathode surrounded by hydrogen. On the contrary, when used for a moment as an anode surrounded by the same gas they showed a marked increase in activity. With some metals the photo-electric current was thirty times as great after using as anode as after use as cathode. This effect was obtained with conducting hydrogen; exposure to non-conducting hydrogen increases the activity, but much less rapidly.

The activity of the metals practically vanished after extended use in either helium or oxygen, nor could any trace of recovery be obtained by use as anode in the same gases. In nitrogen use as cathode did not wholly destroy the activity; with silver alone an increase was obtained by use as anode, slight but definite. Carbon was like silver in this respect.

When the activity had been reduced to a vanishing quantity by use in other gases, it was readily regained by introducing an atmosphere of hydrogen. A gradual disappearance of hydrogen accompanied this increase in activity. After use as cathode in hydrogen, the metal became negatively charged; after use as an anode it was positively charged. These results are readily explained if hydrogen on being absorbed or given off by the metal, carries with it a charge of negative electricity. Whether immediately or indirectly, hydrogen appears to be the prime agent in rendering metals photo-active.

A New Method for Determining the Difference of Potential between a Metal and a Solution of One of its Solids: A. W. EWELL, Worcester Polytechnic Institute.

The experiments of Ayrton and Perry on this subject were repeated with some modifications. A glass vessel was covered with tinfoil which was connected to the needle of a Dolezalek electrometer. Its terminals were connected to those of a 40-cell battery, earthed at the center. A metal electrode placed in a solution of one of its salts was also earthed. One volt gave a deflection of 8 cm. Copper in copper sulphate solution, zinc in zinc sulphate and mercury in potassium chloride were used in the measurements.

The Isothermal Layer of the Atmosphere: W. J. HUMPHREYS, Mt. Weather Meteorological Observatory.

The temperature of the atmosphere decreases more or less uniformly with increase in elevation above the surface of the earth until an elevation of from 30,000 to 60,000 feet is reached, where the temperature is — 50° to — 60° C. From this elevation up as far as balloons have gone the temperature remains practically constant. This is explained as the result of radiation, mainly from the moisture in the air, which will have an effective radiating surface of great extent in comparison with elevations reached by balloons. The means of locating this surface was considered. The relative proportion of the different constituents of the air is different at different elevations, the proportion of water vapor being relatively great in the lower layers. Calculation shows the temperature of this "effective radiating surface" to be about — 33° C. (The calculations were carried through in detail before the joint session.)

Coefficients of Expansion at Low Temperatures: H. G. DORSEY, Cornell University.

Curves were drawn with temperature and expansion as coordinates. Temperatures used ranged from 113° C. (absol.) to 213°, and were secured by the use of liquid air. Selenium and hard rubber gave nearly a straight line, while zinc and gold gave very irregular curves. A second sample of gold of greater purity (obtained from the U. S. mint) gave a straight line. Fiber cut in three different directions with respect to the direction of its grain, was also used.

The full paper is published in the July number of the *Physical Review*.

A. D. COLE,
Secretary Section B.